

The dark side of high tech precious materials recovery. Overview on the critical issues, opportunities and best practices from a material library point of view

Original

The dark side of high tech precious materials recovery. Overview on the critical issues, opportunities and best practices from a material library point of view / Dal Palù, D.; Coraglia, V.; Lerma, B.. - ELETTRONICO. - (2019), pp. 70-72. (Intervento presentato al convegno Relating Systems Thinking and Design (RSD7) 2018 tenutosi a Torino (Italia) nel 24-26 October 2018).

Availability:

This version is available at: 11583/2731806 since: 2019-04-30T12:10:51Z

Publisher:

Politecnico di Torino

Published

DOI:

Terms of use:

openAccess

This article is made available under terms and conditions as specified in the corresponding bibliographic description in the repository

Publisher copyright

(Article begins on next page)

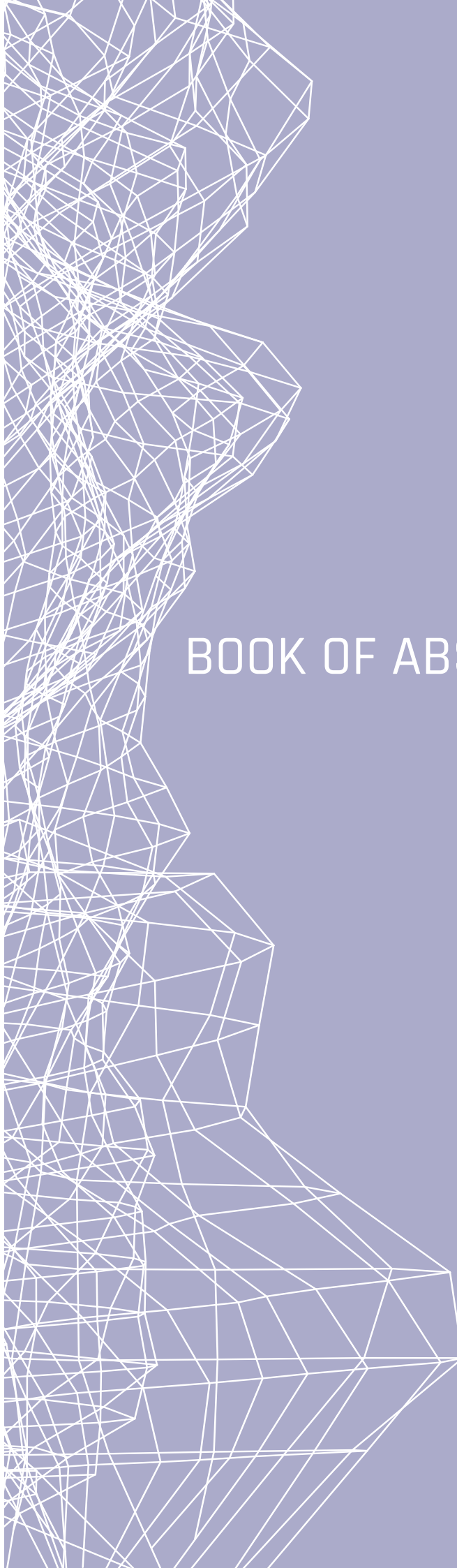
RS D7 2018

RELATING
SYSTEMS
THINKING
AND
DESIGN
7th
SYMPOSIUM

CHALLENGING
COMPLEXITY BY
SYSTEMIC DESIGN
TOWARDS
SUSTAINABILITY

TURIN
23-28.10.2018

BOOK OF ABSTRACTS



Organised by:



**POLITECNICO
DI TORINO**

Department of
Architecture and Design



Scientific partnership:



SID Società Italiana di Design



Sponsor by:



**CONSIGLIO
REGIONALE
DEL PIEMONTE**



CAMERA DI COMMERCIO
INDUSTRIA ARTIGIANATO E AGRICOLTURA
DI TORINO

Book of Abstracts of Relating Systems Thinking and Design (RSD7) 2018 Symposium

Editor: Silvia Barbero

Publisher: Politecnico di Torino

Published in: March 2019

ISBN: 978-88-85745-24-7

The book of abstracts is published and available online as an open access document. Please, cite as:
Author. (2018). Article title. In S. Barbero (Ed.) Book of Abstracts of Relating Systems Thinking and Design
(RSD7) 2018 Symposium. Turin, Italy, October 24-26, 2018.

CONTENTS

KEYNOTE SPEAKERS

- 10 | **Bistagnino Luigi** - Systemic Approach generates a new cultural paradigm
- 11 | **Bunnell Pille** - With a Grain of Salt
- 12 | **Govera Chido** - The Future of Hope: Social care for sustainable living
- 13 | **Iñiguez Flores Roberto** - Advanced Design cultures, a learning system perspective
- 14 | **Mauldin Chelsea** - Policy Design & Decision Making
- 15 | **Pauli Gunter** - Re-designing the framework: think natural, think local

PLENARY SPEAKERS

- 17 | **Jones P., Monastiridis S., Ryan A., Tøye V., Van Ael K., Vandenbroeck P.** - State of the Art Practice: Are we Ready for Systemic Design Toolkits?
- 20 | **Sevaldson Birger** - Systemic Design Association
- 22 | **Simon Widmer** - Circular Economy Toolkit

1 | POLICY DESIGN AND DECISION-MAKING

- 24 | **Bellefontaine T., Soliman M.** - Integrating Systems Design and Behavioral Science to Address a Public Sector Challenges from Within
- 27 | **Faiz K., Faiz P., Adha Binti Nordin N., McDonagh D., Woodcock A., Binti Shamsul Harumain Y. A.** - Permeating the barriers between the individual and policy designers in Pakistan: a cross-cultural study of women's mobility
- 32 | **Fassio F., Tecco N.** - Turin Food Atlas. Sharing knowledge towards urban food policies to develop circular cities
- 35 | **Feast L.** - Constitutional Realism and Sustainability: Lessons Learned From a Systemic Design Investigation of New Zealand's Democratic System
- 37 | **Mastroeni M.** - Smart specialization in non-metro canadian regions
- 40 | **Mehta N., Richard C., Raut S., Nahar P.** - A Systems Approach to Sustainability in Space
- 43 | **Metzner-Szigeth A.** - Eco-Social Transformations: Leading Principles and Generative Forces
- 45 | **Muirhead L., Mosse R., Hachey A., Scott N.** - Integration of multiple approaches into the Social Lab practice. A case study from a Social and Public Innovation Lab in New Brunswick, Canada.
- 47 | **Paulsen A., Wildhagen B., Sevaldson B.** - Gearing up the level of systems oriented design in public sector. Case, experiences and learning from Stimulab innovation program
- 50 | **Peter K., Kerr H.** - Alternative Narratives on Economic Growth: Prototyping Change at the System Level
- 53 | **Stamatopoulou A.** - Mapping-and-Designing (in) relationally composed fields

- 62 | **Taverna A., Mortati M.** - A reflection on connecting complexity theory and design for policy
- 66 | **Wildhagen B.** - Understanding variations of entanglement and complexity: A way to influence expectations of Service and Systems Oriented Design in public sector

2 | INDUSTRIAL PROCESSES AND AGRI-FOOD SYSTEMS

- 70 | **Dal Palù D., Coraglia V., Lerma B.** - The dark side of high tech precious materials recovery. Overview on the critical issues, opportunities and best practices from a material library point of view
- 73 | **Darzentas J., Darzentas J., de Bruin A., Power M., Prado P., Carmien S., Hobbs E.** - Systemic Design in Food Security and Resilience: Building A Holon
- 77 | **Giordano R., Montacchini E., Tedesco S.** - Building the fashion's future. How to turn textiles' wastes into ecological building products
- 80 | **Konietzko J., Bocken N., Hultink E. J.** - Business Experiments for Circular Urban Food System
- 82 | **Savio L., Thiebat F., Bosia D., Pennacchio R., Manni V.** - Natural fibers insulation panels: an adaptive production
- 85 | **Van der Velden M., Geirbo H. C.** - Repair = Care : Systems stories from Norway and Ghana

3 | SOCIO-TECHNICAL SYSTEMS IN THE DIGITAL AGE

- 88 | **Das B., Nahar P.** - Circular Economic Service System Design for Community Based Flood Resilience. Designing a Collaborative Grain Storage and Service System for the Annually Flood Prone Communities of Assam, India
- 92 | **Fiore E.** - New strategies for the refrigerator in the transition towards a circular economy
- 95 | **Germak C., Giuliano L., Abbate L.** - Co-design processes for cleaning and facilities services system
- 98 | **Lomas J., Patel N., Forlizzi J.** - Continuous Improvement: How systems design can benefit the data-driven design community
- 100 | **Tamborrini P., Remondino C., Marino C.** - Data, Fashion System and Systemic Design approach: an information flow strategy to enhance sustainability
- 103 | **Valpreda F., Cataffo M.** - Participatory Design for Service Robotics

4 | TERRITORIAL METABOLISM AND FLOURISHING ECONOMIES

- 107 | **Ambrogio F., Comino E., Dominici L., Rosso M.** - The use of water for technical development or technical development for the use of water?
- 110 | **Battistoni C., Barbero S.** - Systemic design for territorial development: ecosystem to support autopoietic local economies
- 114 | **Bofylatos S., Kampasi I., Spyrou T.** - Designing resilient creative communities through biomimetic service design
- 116 | **Bozzola M., De Giorgi C.** - Packaging reconditioned household appliances
- 119 | **Bucci D., Franconi A., Piovesan F., Tagliazucchi S.** - Analyzing OvestLab's collaborative regene-

ration process through a systemic design lens

- 122 | **Cattozzo L., Marotta L.** - Landscapes and systemic design: Po river Delta (Italy) case
- 125 | **Giraldo Nohra C., Barbero S.** - Post-industrial areas on the lens of systemic design towards flourishing urban resilience
- 129 | **Lambiase N.** - Mapping the Circle. Systemic analysis of the experiences of circular economy in Italy through an app
- 132 | **Lemos Oliveira Mendonca R. M., Ribeiro de Mello E. M., de Oliveira Nery S., Horacio M. P., Ro-meiro Filho E.** - Systemic network around education and community gardens
- 135 | **Schaus M.** - Narrative and Value: Authorship in the Story of Money
- 138 | **Toso D., Luthe T., Kiss T.** - The Systemic Design approach applied to water treatment in the alpine region
- 143 | **Varanasi U.** - Life conservation; A study into systemic design for wildlife

5 | SOCIAL CARE AND HEALTH SYSTEMS FOR SUSTAINABLE LIVING

- 145 | **Campagnaro C., Ceraolo S., Di Prima N.** - Systemic and participatory design processes in care systems
- 149 | **Eriksson D., Turnstedt L.** - The Nordics as World Leaders in Sustainable Healthcare and why it Matters to you
- 155 | **Gharavi N., Hozhabri M.** - @Home in Transition. Encouraging asylum seekers towards more self-driven approaches to navigate the unknown they are surrounded with.
- 157 | **Kumar A., Wagle P., Bandarkar V., Nahar P.** - Design for the taste-makers: System oriented social innovation for improving the living condition of salt pan labourers
- 160 | **Kumar G. N., Gupta I., Ruchatz J., Nahar P.** - Ethos Design for a Good Quality Life : Building an innovation framework for individuals and organizations towards resilience and cognitive flexibility
- 163 | **Landa-Avila I. C., Escobar-Tello C., Jun G. T.** - Holistic outcome-based approach towards sustainable design healthcare: aligning the system purpose through system visualisation
- 165 | **Nie Z., Zurlo F.** - Human-centered Approach for Flourishing: Discovering the Value of Service Ecosystem Design in Psychosocial Career Counselling Service
- 167 | **Rygh K., Støren Berg M., Romm J., Morrison A.** - Pre-fuzzy front end alignment of multiple stakeholders in healthcare service innovation - unpacking complexity through service and systems oriented design in Strategy Sandboxes
- 171 | **Savina A., Vrenna M., Menzardi P., Peruccio P. P.** - The Impact of Food Production on Public Health: Systemic Strategies for a Diffused and Transversal Prevention Plan

6 | MODELS AND PROCESSES OF SYSTEMIC DESIGN

- 176 | **Barba E., Osborn J.R.** - Measuring Sophistication in Systemic Design and Computing
- 179 | **Besplemennova Y., Tassi R.** - Systems Thinking for Service Design
- 182 | **Boehnert J.** - The Visual Representation of Complexity: Sixteen Key Characteristics of Complex Systems
- 185 | **Chaplin H., Christopherson K.** - Re-Defining Journalism Education: Using Systems Thinking and Design to Revolutionize the Future of Storytelling

- 187 | Chung Y., Renaux J., Chikermane V., Rajani J. J.** - Co-Designing a Social Innovation Model for Changemakers
- 190 | Darzentas J., Darzentas J.** - Perspectives on Systemic Design: examining heterogeneous relevant literature to provide a historical and 'systemically inspired' review
- 194 | Davidová M.** - Trans-Co-Design in Systemic Approach to Architectural Performance: The Multi-Layered Media and Agency in Creative Design and Its Processes
- 198 | Jamsin E.** - Computational Models in Systemic Design
- 203 | Jones P.** - Evolutionary Stakeholder Discovery: Requisite System Sampling for Co-Creation
- 205 | Lockton D.** - Old Rope: Laing's Knots and Bateson's Double Binds in Systemic Design
- 208 | Luthé T.** - Systemic Design Labs (SDL): Incubating systemic design skills through experiential didactics and nature-based creativity
- 210 | Maessen C., van Houten S., van der Lugt R.** - Future Probing for Proadaptive Organizations
- 215 | Marines Hernández L. E.** - Mapping disciplinary mobility for tackling complex problems
- 217 | Matic G., Matic A.** - Design for Emergence – Enabling Stakeholder Liminal Transitions and Innovation Value Pivoting through Complex Systemic Transformations
- 220 | Murphy R.** - Finding the emic in systemic design: Towards systemic ethnography
- 223 | Murphy R., Jones P.** - Give me the place to stand: Leverage analysis in systemic design
- 226 | Passia Y., Roupas P.** - The Contingent City: decoding the possibilities of the city's sociospatial metabolism
- 234 | Perera D.** - Wicked Problems, Wicked Humor: Fun machines as a Method to Frame Wicked Problems in Architecture
- 236 | Real M., Lizarralde I.** - A constructivist and soft view of systemic design. A tribute to Jean Michel Larrasquet's work
- 239 | Sevaldson B.** - Beyond User Centric Design
- 242 | Silverman H., Rome C.** - Distinctions and Analogies: Mapping Social System Identity
- 245 | Snow T.** - Regenerative Value Systems – Model(s) illustrating flows and transformations of value within production systems
- 252 | Sweeting B.** - Radically Constructing Place
- 254 | Tekogul I.** - Design as adaptation
- 257 | Thompson W. T., Mesquita Da Silva F., Steier F.** - Binocular vision of designing process for whole systems design crossing boundaries
- 260 | Van Alstyne G., Skelton C., Nan Cheng S.** - Systemic Design and Its Discontents Designing for Emergence and Accountability
- 263 | Van Gessel C., Van der Lugt R., De Vries R.** - Socionas: Bringing the systemic view into the design for health and sustainability
- 269 | Vargas Espitia A., Guataquira Sarmiento N. A., Álvarez Quintero C. D., Rugeles Joya W. R.** - Integration of methodologies through an academic toolkit for the design of products services systems for sustainability - SPSS - in Colombian contexts
- 274 | Vezzoli C., Basbolat C.** - System Design for Sustainability for All. S.PSS Design applied to Distributed Economies
- 278 | Zivkovic S.** - The Early Stage Analysis of a Systemic Innovation Lab

The seventh *Relating Systems Thinking and Design (RSD7)* symposium was held at the Politecnico di Torino, the 23-28 October 2018, for the first time in Italy, defining an important collaboration among the institutions that founded the informal group of Systemic Design Research Network (SDRN) in 2012. Not by chance, this symposium has seen the official establishment of the Systemic Design Association (SDA), with a public announcement during the first day. A new phase of the association and of the RSD symposiums started by proposing an inclusive approach to expand the membership and engage different systems- and design-oriented professionals and researchers, while looking after a strong identity of systemic design as a discipline.

The proceedings show the huge amount of contributions we received from all over the world that have inspired more than 200 people in Turin. The aim was to promote international debate on the multiple applications and purposes on which the systems thinking in design is developed towards sustainability. The symposium generated nurturing interdisciplinary collaborations and discussions, involving academics, designers and professionals. *“Challenging complexity by Systemic Design towards sustainability”* was the leitmotif of all RSD7 starting from the workshops, through the keynotes, the plenaries and the parallel speeches, and closing with the de-conference at Monviso Institute.

Four workshops were organized by international experts, coming from *Smart Circular Economy Network*, *University of Brighton*, *Ellen Mac Arthur Foundation*, *Namahn center* and *ShiftN*. Around 100 attendees had a full day workshop in which they investigated the theme of complexity, declined through different areas: IoT, material/immaterial places, Circular Economy and Systemic Design. At the end of the day, the workshops' results were shown in a plenary session and discussed all together with a breaking ice kick-off.

From 24th to 26th October, we had the proper symposium with 6 inspiring keynote speakers, 3 plenary sessions, and 76 presentations in the parallel sessions. We evidenced all the contents through abstracts, presentations and working papers, as well as videos and sketch-notes.

The RSD7 keynotes offered an inspiring range of perspectives on systemic design, emerging from different disciplines and experiences from all over the world. They brightly explained how Systemic Design can effectively integrate systems thinking with design to address complexity, by creating new resilient and sustainable systems in very diverse contexts. We decided to interview them and provide to the whole community a short video to have a glance of their contribution.

The plenary speakers were invited to explore special themes of interest for the community: the newborn Systemic Design Association, the pioneering activities run by Ellen Mac Arthur Foundation and the stimulating Systemic Design Toolkit.

The presentations in parallel sessions were dense and reflected the tracks we proposed. Here we have condensed the wide variety of contributions:

- **Policy design and decision-making** (Innovation in territorial governance, Strategies for sustainable innovation, Design thinking for decision-making, Democracy and responsibility);
- **Industrial Processes and Agrifood Systems** (Industrial ecology in a Circular Economy, Sustainable innovation in industrial development, Sustainability

ty of agro-industrial systems);

- **Socio-technical Systems in the Digital Age** (User interaction and enhancement in the age of AI and autonomy, Internet of Things for sustainability, Information technologies in the design domain, Systemic Design for learning from data);
- **Territorial Metabolism and flourishing economies** (Local resources innovation transitioning to a Circular Economy, Sustainable development of regions and bioregions, City metabolism and urban ecologies, Interdisciplinary models for economy-design, New ways of communicating economic systems)
- **Social Care and Health Systems for Sustainable Living** (Sustainable innovation for health systems, Patient empowerment and caregiving, Systemic innovation in social care, Social Flourishing & Cultural Sustainability);
- **Models and Processes of Systemic Design** (Systemic Design theories, Innovation processes in complex systems, Systems and design thinking in education, Historical perspectives on Systemic Design).

The process to select the best presentations was crucial and it required double (and in some case triple or more) reviews, trying to provide a wider spectrum of experiences. In the end, the success rate was 48%. About two third of the presenters have submitted working papers.

The conference was also enriched by the exhibition “Visualizing Complex Systems”. The ability to collect, cross-check, visualize and study quantitative and qualitative information about phenomena and their patterns is itself at the core of the project, becoming strategic for enabling new systems thinking and their design application. Identifying the relationship between components, thus guaranteeing personal expression, horizontal communication and visual thinking, is the first step to enhance a more conscious and transparent decision-making process with a perspective of sustainability.

During the 7th edition of RSD we also experienced some moments of relaxed “learning-and-doing time”, during the “Books and Beers” events and the De Conference Event. In fact, at the end of each day, 3 decompressing “Books and Beers” were hosted in the close venue of Eataly. On that occasion, 5 recently published books were introduced to the audience and discussed in a more informal environment.

After the conventional RSD symposium, for the first time in its history, we proposed a 2-days De-Conference event, to favour networking, deepen conference topics and have a relaxed “learning-and-doing” time in a beautiful natural environment. It took place at MonViso Institute, in the community of Ostana, and it was organised in collaboration with ETH Zürich.

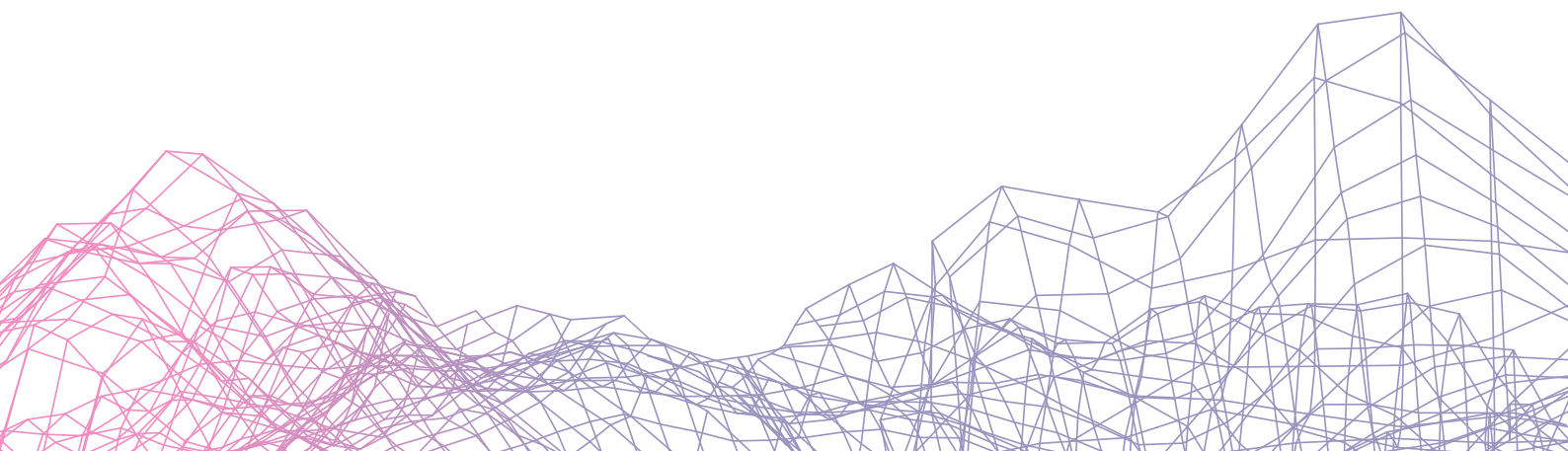
Lastly, I would like to take the chance of this publication to thank the international scientific committee because in the preparation phase they always pushed me towards higher and higher goals. A special thank goes to all the keynote speakers to have been central actors of this conference, sharing their inspiring experiences and knowledge. Finally, I would like to thank the local organizing committee because they supported me in every request and with great confidence in our capacity.



RSD7 and SDA chair

Turin, 29.03.19

2 | INDUSTRIAL PROCESSES AND AGRI-FOOD SYSTEMS



The dark side of high tech precious materials recovery.

Overview on the critical issues, opportunities and best practices from a material library point of view

**Dal Palù Doriana,
Coraglia Valentina,
Lerma Beatrice**

Politecnico di Torino
doriana.dalpalu@polito.it
valentina.coraglia@polito.it
beatrice.lerma@polito.it

KEYWORDS

Circular economy;
Environmental sustainable
processes;
Ethics in design;
E-waste;
Recycled materials;
Precious and non-precious metals;
urban mining.

Eco-sustainable design strategies act as the liaison between different disciplines and professionals: the world of production and research, companies and the key issues of project development –economics, society and environment [Lerma, 2014]. Many of the environmental sustainability issues are either directly or indirectly linked to materials and their life cycle [Lindahl, Robèrt and Broman, 2014]. Environmental impacts occur at different stages of the life cycle, including the extraction, production, transportation and processing of raw materials, as at the stage when the product is actually used and disposed of [Vezzoli and Manzini, 2007]. Furthermore, a material can be considered eco-sustainable when it is effectively and efficiently used within a specific project and integrated into the entire application system. Moreover, it comes to environmental sustainability when opting for the use of materials and semi-finished products sourced from areas comparable to that where the company operates [Allione, De Giorgi, Lerma and Petrucci, 2012]. Therefore, creating a network of contacts in the region able to assist manufacturing companies, particularly SMEs, when selecting their suppliers or researching and assessing local partners for processing operations appears as more and more necessary, but this approach cannot be always pursued.

Eco-sustainable design strategies play a role of utter importance for the development of innovative sustainable products and production processes [El-Haggar, 2007]. Specifically, in an evolving scenario of increasing dematerialization and greater complexity of objects, several specific materials already in production and those still being field tested, become more meaningful [Ferrara, 2004], such as those precious and not precious ones coming from the e-waste domain. The rapid expansion of technology and, what is more, the programmed obsolescence of these products, means that a very large amount of e-waste is created every year, every day, every minute [Baldé, Forti, Gray, Kuehr, and Stegmann, 2015].

Different materials are present in e-waste: the base metals include iron, copper, aluminium, nickel, zinc, selenium, indium, gallium and precious metals. Hazardous substances that can be found in e-waste include mercury, beryllium, lead, arsenic, cadmium and antimony instead. In addition, the larger material group consists of plastics, glass and ceramics [Fornalczyk, Willner, Francuz and Cebulski, 2013], adopted for the case and the outer part of the devices. The availability of these materials generated the new definition of “urban mining” as the activity of recovery materials from urban waste becoming “the mines of the future”, and providing materials for reuse and cutting costs and landfill waste.

The recovery of metals and precious metals from electronic waste (e-waste) has been in fact an important topic not only for economic aspect but also for recycling rare natural sources and reducing the e-waste to prevent the environmental pollution, in other terms, following the 7Rs Golden Rule usually adopted for a sustainable waste management [El-Haggar, 2007]: in order to achieve the correct use and application of materials from a green perspective, eco-compatibility must in fact be considered when they are chosen as much as when they are at the end of their life.

Additionally, today's materials are smart and encase an inner core of performance and function that could previously only be given by complex systems. Other key elements that have to be taken into account regarding environmental sustainability are the players involved in the design and manufacturing processes, the origin of the resources and the location of the suppliers and manufacturers and the development of further production [Ceppa and Lerma, 2014].

One possible eco-sustainable approach towards the issue of e-waste is offered by Circular Economy [Geissdoerfer, Savaget, Bocken and Hultink, 2016] and the related System Design thinking [Barbero, 2016], suitable for dealing with industrial processes strategically, and aiming at recovery precious second life materials to new applications, both into the same productive chain, or to new ones. With this approach, thousands of electronic appliances (such as audio-visual components, televisions, VCRs, stereo equipment, mobile phones, other handheld devices, and computer components contain valuable elements and substances suitable for reclamation, including lead, silver, copper, and gold) are dismantled, and their materials are divided in order to be conveyed to new productive chains, new productive systems and new proactive industries. Nevertheless this procedure still doesn't avoid critical issues. As an example, this process entails social, environmental and legal questions, such as those generated by the uncontrolled movement of e-waste to countries where cheap labour and primitive approaches to recycling have resulted in health risks to local residents exposed to the release of toxins continues to an issue of concern [Ottaviani, 2018].

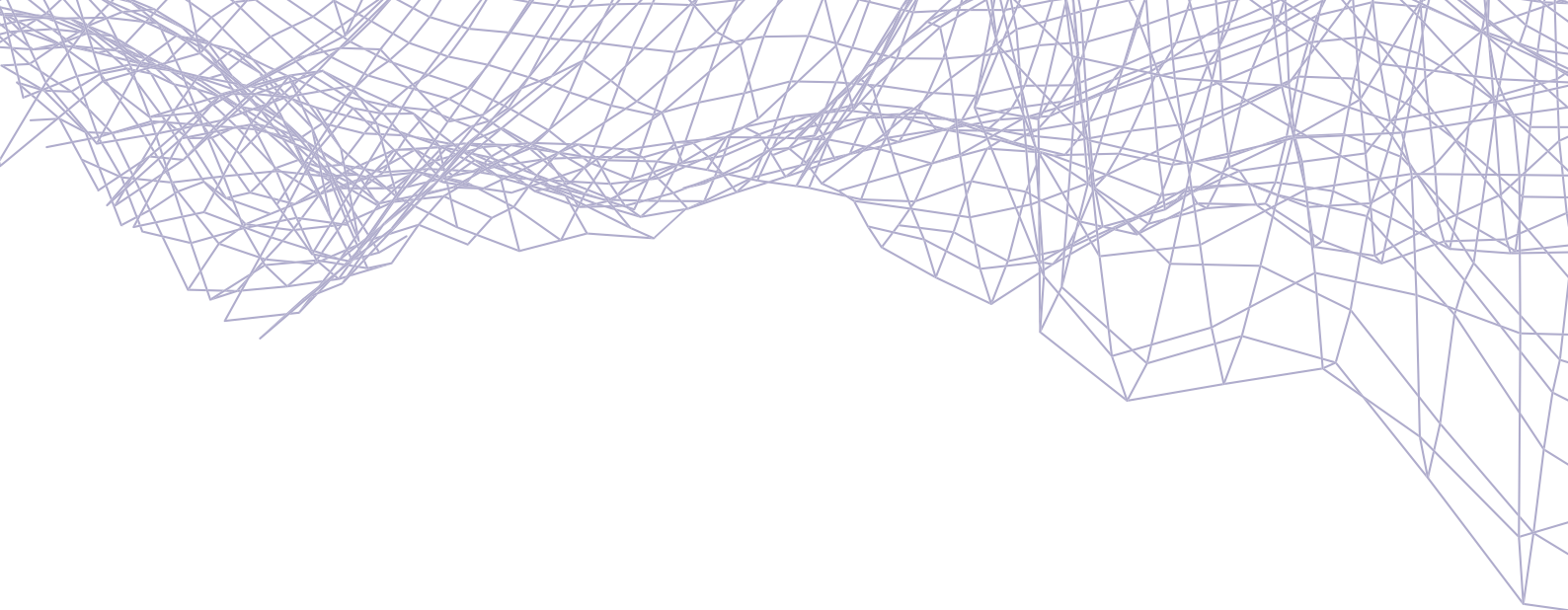
This investigation presents a panoramic overview, as well as the specific point of view of a material library on the topic. The aim will be showing the most recent data about the global amount of e-waste production, analysing the potentialities of innovation in terms of sustainable production and Circular Economy applied to the new application fields of these innovative - or renewed - materials in the Italian context; and showing how a material library can be valid support for the already existing SMEs, companies and designers in boosting this virtuous process. On the other hand, the most critical consequences of e-waste recovery are discussed and analysed, supported also by several case studies taken from the world of design and craftsmanship, dedicated to highlight this complex issue, showing how eco-sustainable design strategies can really trigger virtuous mechanisms of economic development.

REFERENCES

- Allione, C., De Giorgi, C., Lerma, B. & Petrucci, L. (2012). From ecodesign products guidelines to materials guidelines for a sustainable product. Qualitative and quantitative multicriteria environmental profile of a material. *Energy* 39, (Amsterdam: Elsevier) pp. 90-99.
- Baldé, C. P., Forti, V., Gray, V., Kuehr, R. and Stegmann, P. (2015). E-waste statistics: Guidelines on classifications, reporting and indicators. (Bonn: United Nations University).
- El-Haggar, S. (2007). Sustainable Industrial Design and Waste Management. Cradle-to-cradle for Sustainable Development. (San Diego: Elsevier Academic Press).
- Lerma, B. (2014) Materials in sustainable design. Characteristics and potential of materials for low environmental impact design. In *Towards conscious design. Research, environmental sustainability, local development. The Intra-regional Alcotra - EDEN EcoDesign Network project*. Eds. C. Ceppa and B. Lerma (Turin: Umberto Allemandi) pp. 46-57.
- Lindahl, P., Robèrt, K. and Broman, G. (2014) Strategic sustainability considerations in materials management. *Journal of Cleaner Production* 64 (Amsterdam: Elsevier) pp. 98-103.
- Ferrara, M. (2004) *Materiali e innovazioni nel design. Le microstorie* (Rome: Gangemi Editore) pp. 95.
- Fornalczyk, A., Willner, J., Francuz, K., Cebulski, J. (2013) E-waste as a source of valuable metals. *Archives of Materials Science and Engineering* 63/2, pp. 87-92.
- Ceppa, C., Lerma, B. (2014) Eco-sustainable production networks: from the choice of zero-mile resources to new uses of outputs. In *Towards conscious design. Research, environmental sustainability, local development. The Intra-regional Alcotra - EDEN EcoDesign Network project*. Eds. C. Ceppa and B. Lerma (Turin: Umberto Allemandi) pp.84-95.
- Geissdoerfer, M., Savaget, P., Bocken, N. M. P., Hultink, E. J. (2016) The Circular Economy - A new sustainability paradigm? *Journal of Cleaner Production* 143, pp. 757-768.
- Barbero, S. (2016) Opportunities and challenges in teaching Systemic Design. The evolution of the Open Systems master courses at Politecnico di Torino. In *Proceedings of the 6th International Forum of Design as a Process, Universitat Politècnica de València, Valencia*, pp. 57-66.

Ottaviani, J. (2018) E-waste republic. In Internazionale, <https://www.internazionale.it/webdoc/ewaste-republic/> (accessed on 10th May 2018).

Vezzoli C., Manzini, E. (2007). Design per la Sostenibilità Ambientale. Patronised United Nation Decade Education for Sustainable Development (Bologna: Zanichelli).



RSD7 CONFERENCE

Book of Abstracts | credits

RSD7 Conference Chairs:

Silvia Barbero (POLITO), Conference chair
Claudio Germak (POLITO), Chair on Human-centred Design
Pier Paolo Peruccio (POLITO), Chair on Systemic Design History
Paolo Tamborrini (POLITO), Chair on Systemic Innovation

International Organizing Committee:

Silvia Barbero (POLITO)
Jenny Darzentas (University of the Aegean)
John Darzentas (University of the Aegean)
Jody Forlizzi (Carnegie Mellon University)
Tore Gulden (HIOA)
Peter Jones (OCAD University)
Harold Nelson
Amina Pereno (POLITO)
Alex Ryan (MaRS Solutions Lab)
Birger Sevaldson (AHO)

Graphic Design and Layout:

Eliana Ferrulli
Amina Pereno

Local Organising Committee:

Eliana Ferrulli
Amina Pereno
Chiara Battistoni
Agnese Pallaro
Carolina Giraldo Nohra
Flavio Montagner
Eleonora Fiore
Chiara Remondino
Barbara Stabellini

Supervisor:

Silvia Barbero